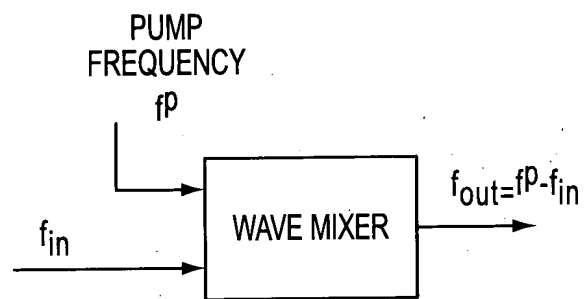


FIG. 1



DIFFERENCE-FREQUENCY GENERATION

FIG. 2

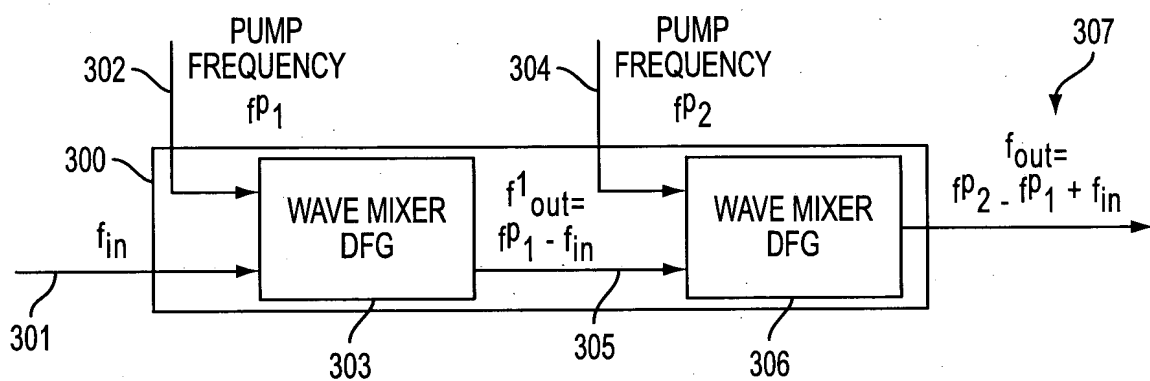


FIG. 3

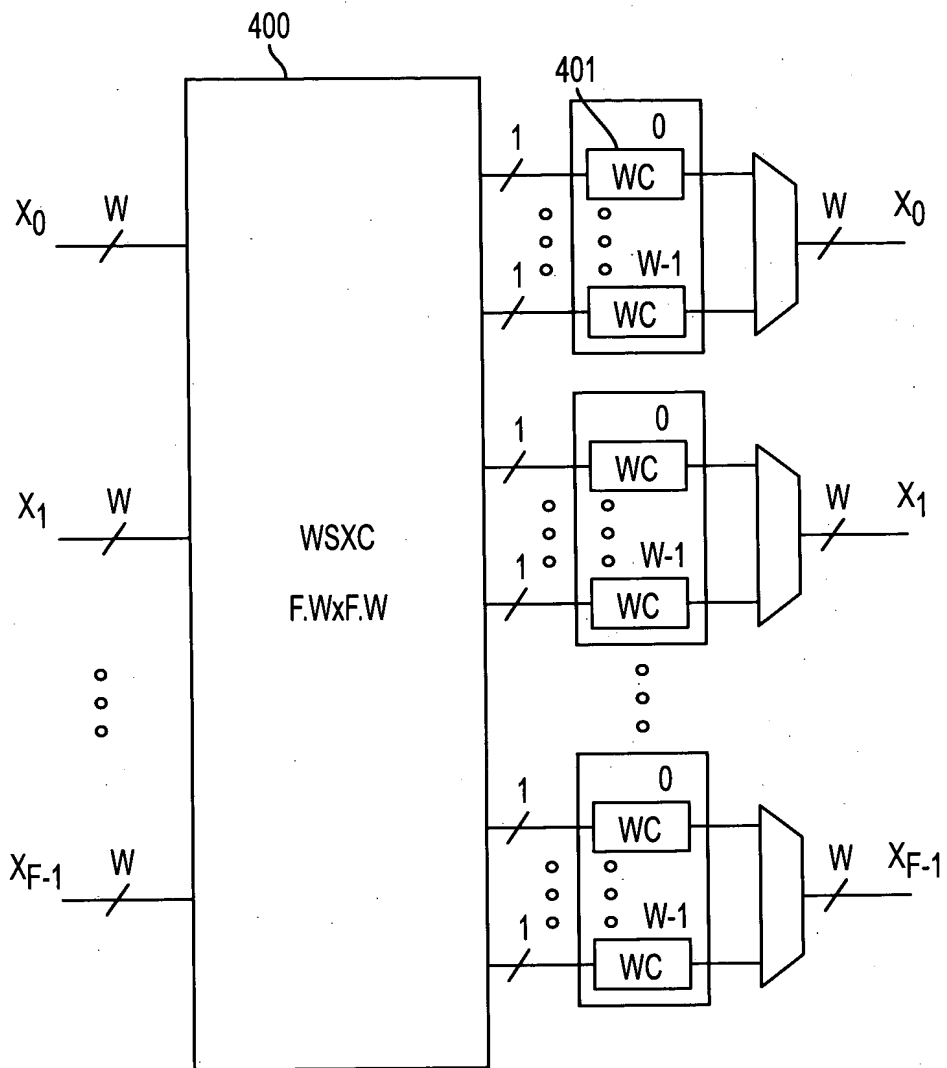


FIG. 4

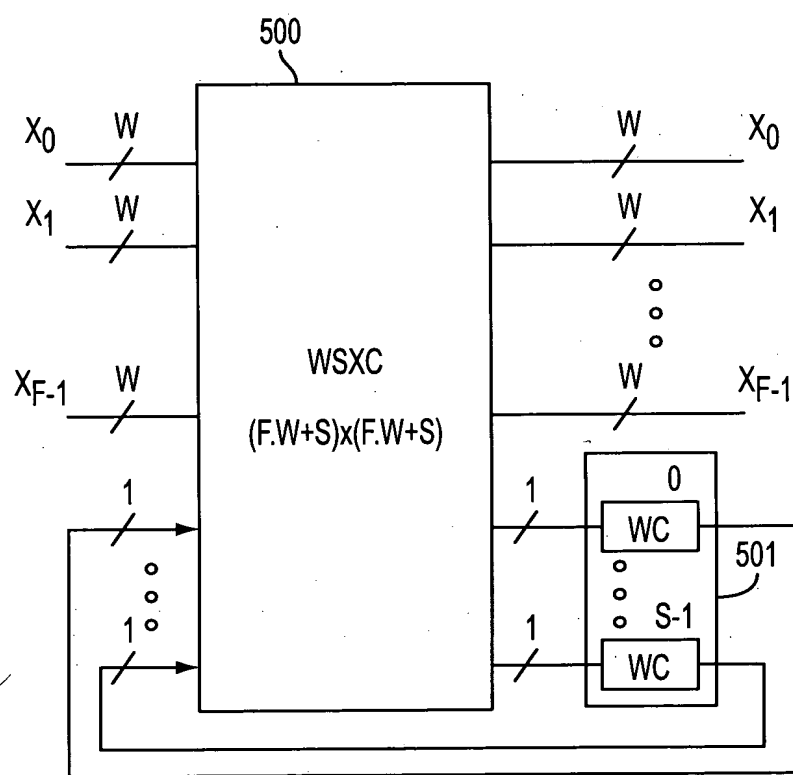
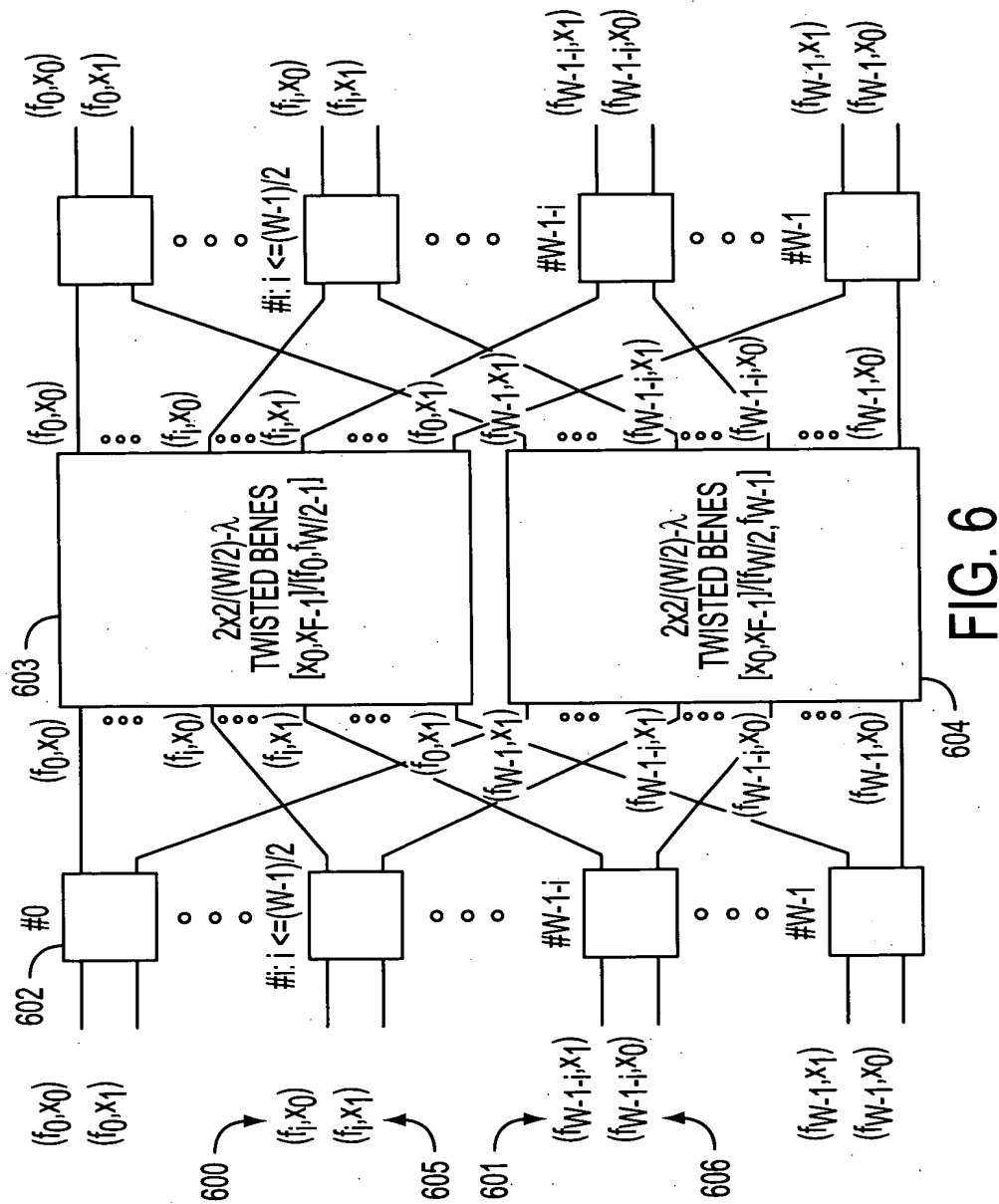


FIG. 5



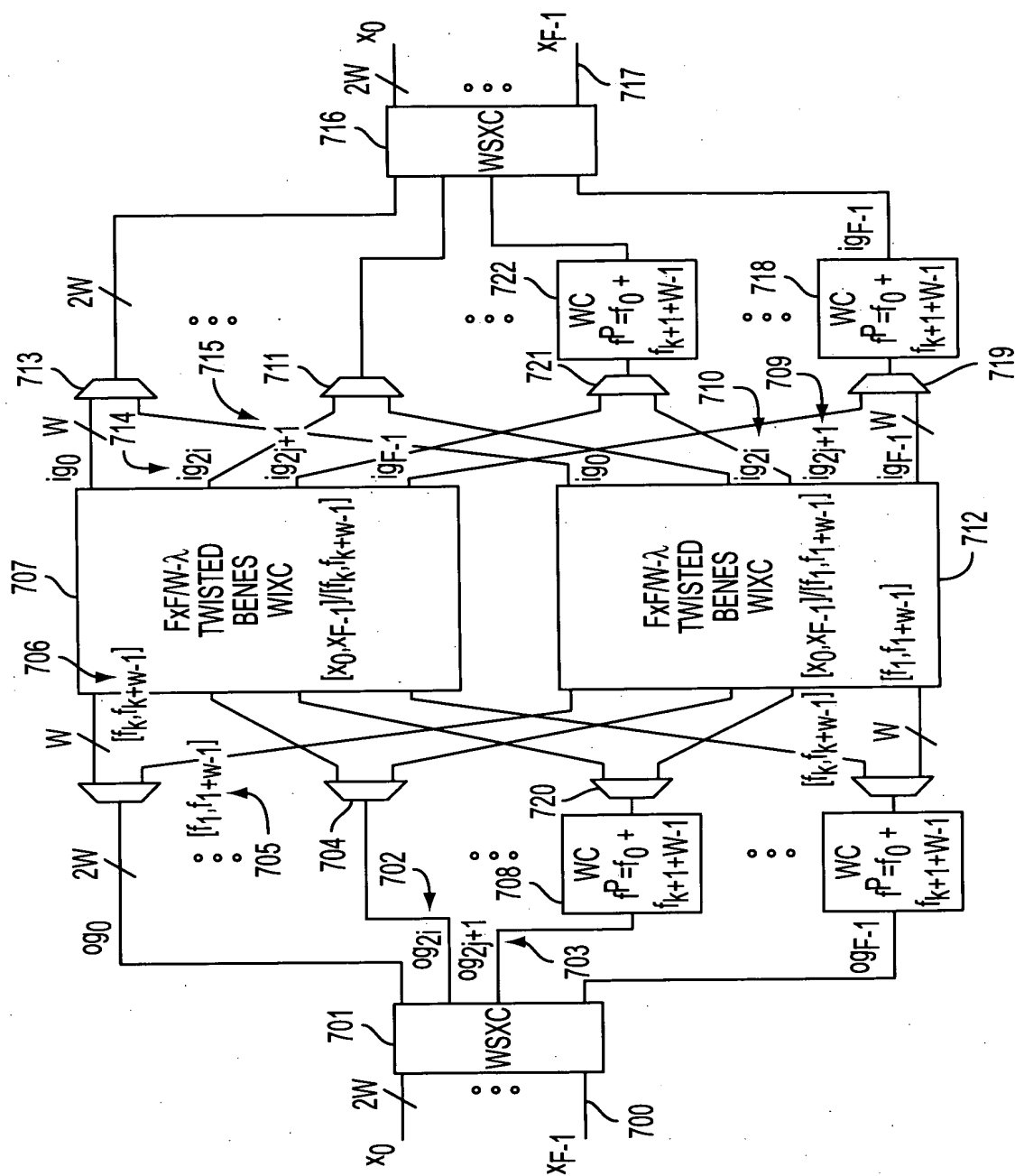


FIG. 7

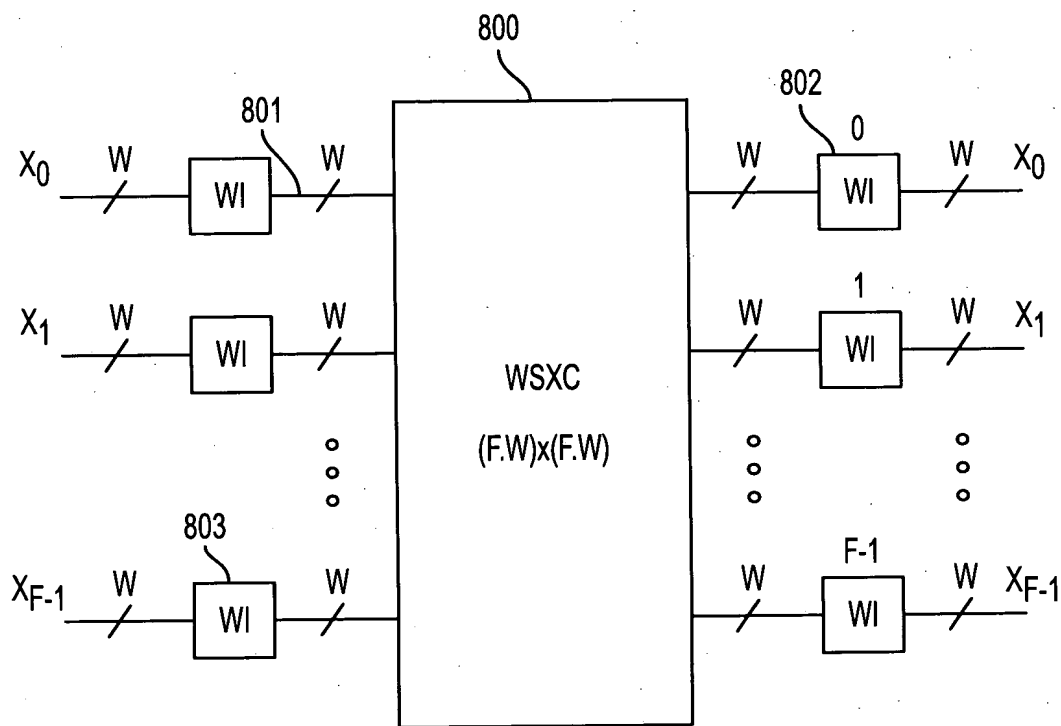


FIG. 8

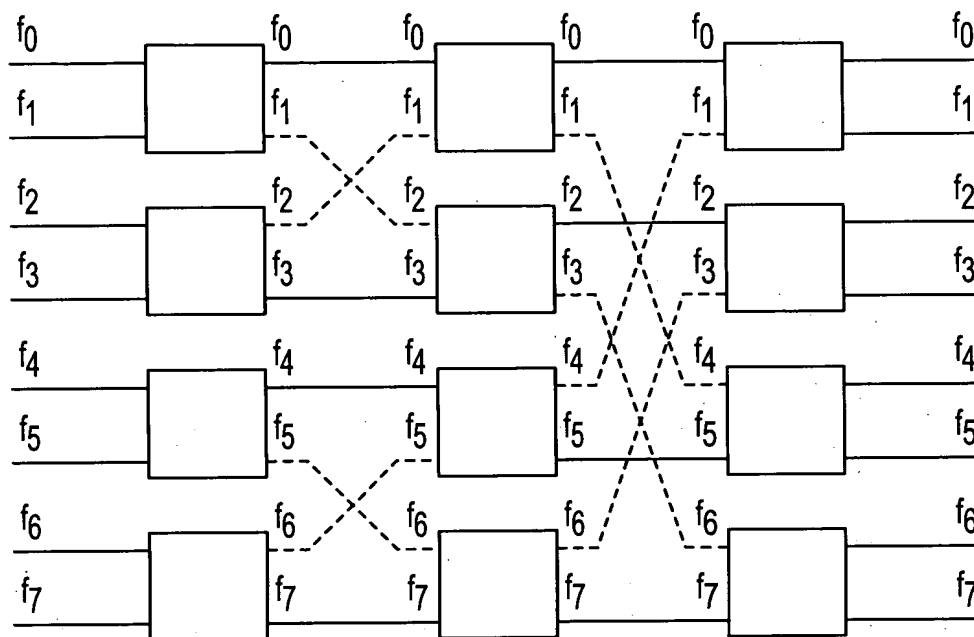
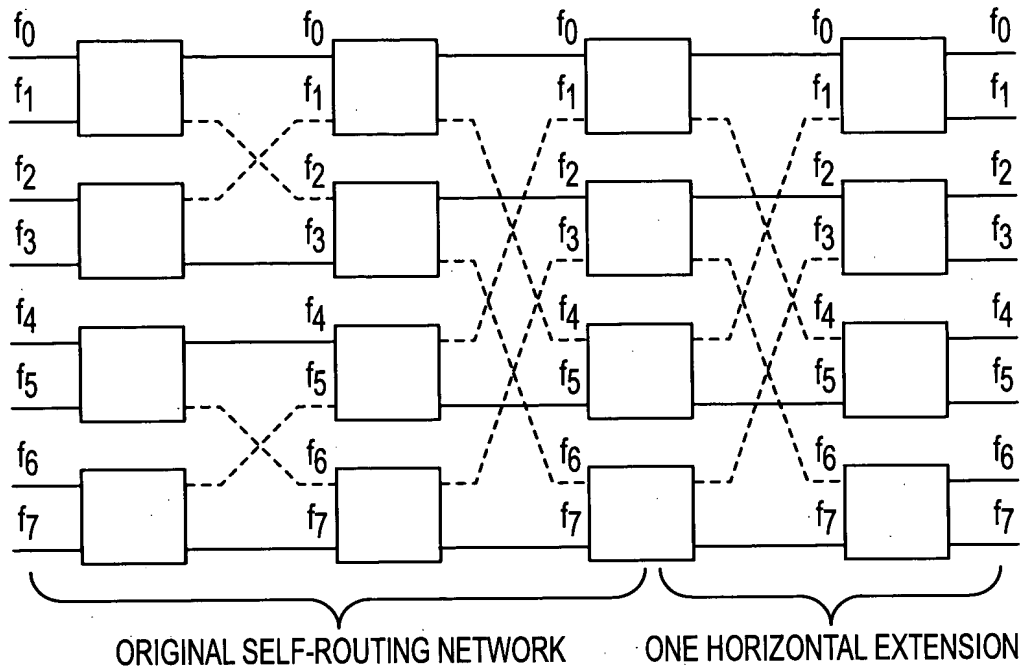


FIG. 9

$\text{LOG}_2(8,1,1)\text{NETWORK}$



$\text{LOG}_2(8,2,1)\text{NETWORK}$

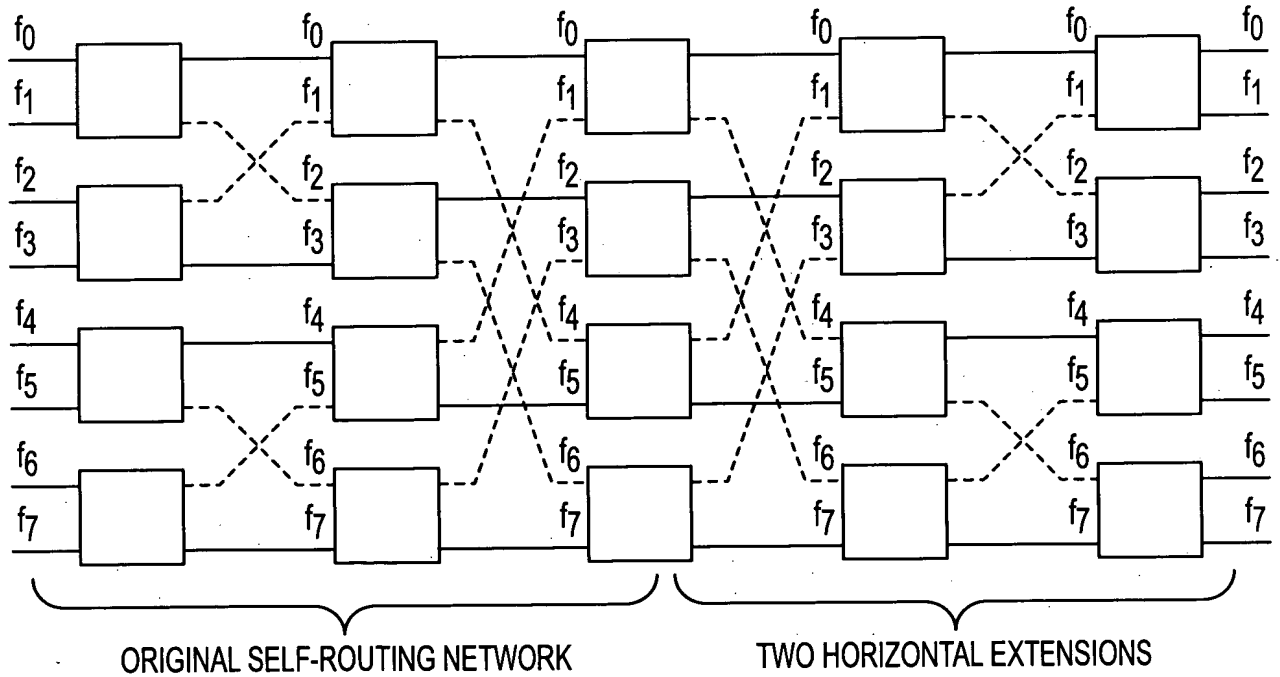
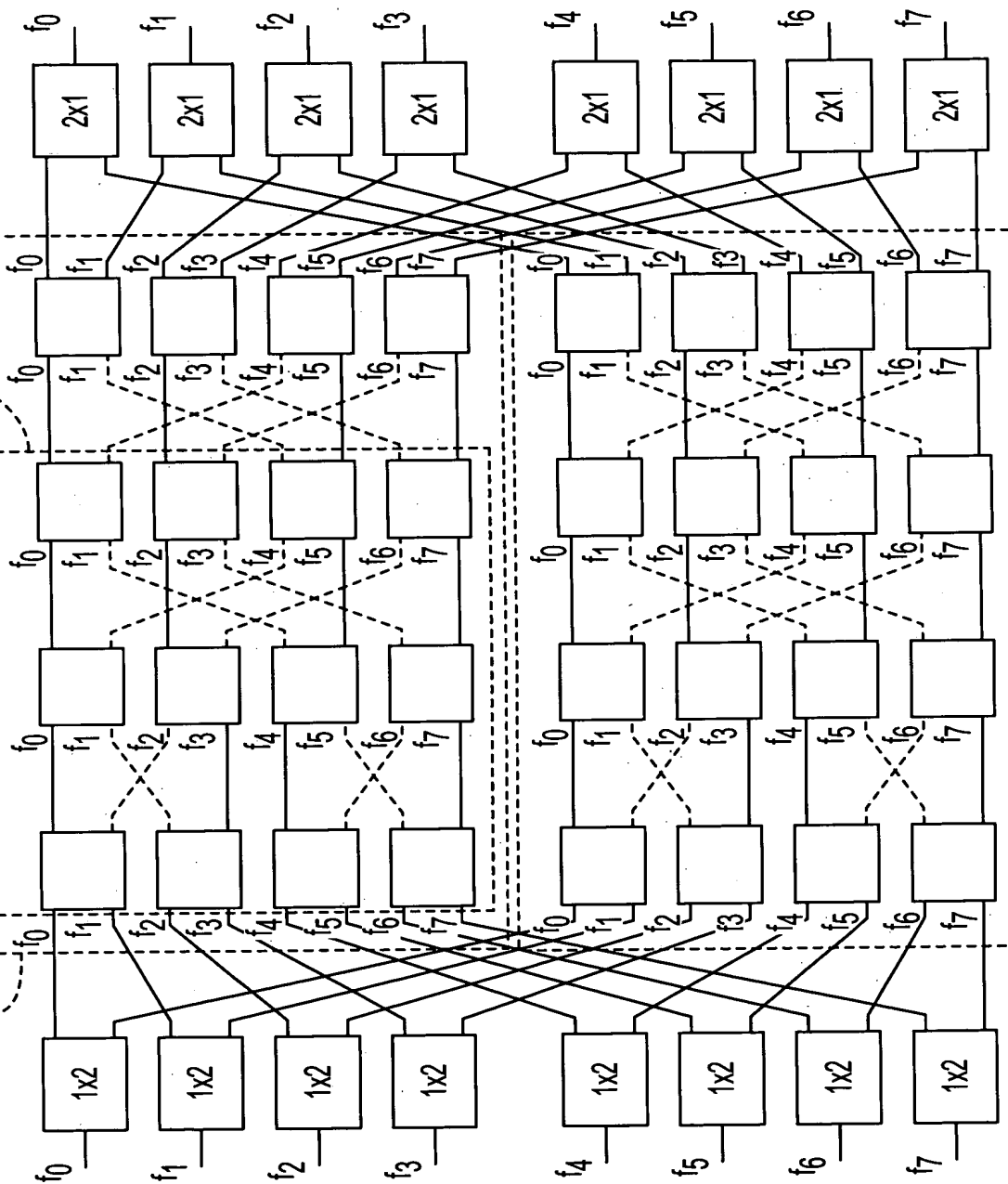


FIG. 10

ORIGINAL SELF-ROUTING NETWORK

1ST COPY



2ND COPY

FIG. 11

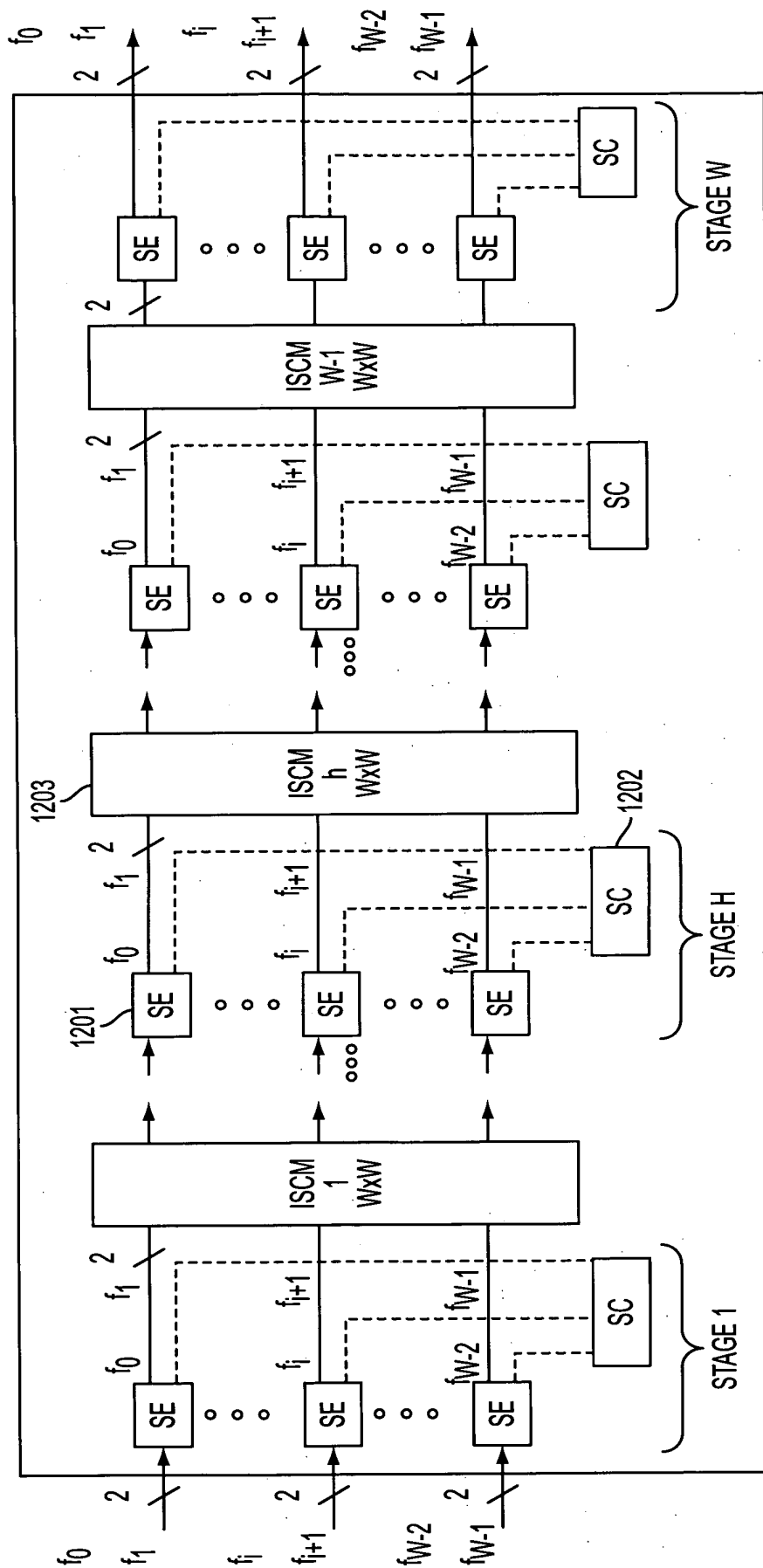


FIG. 12

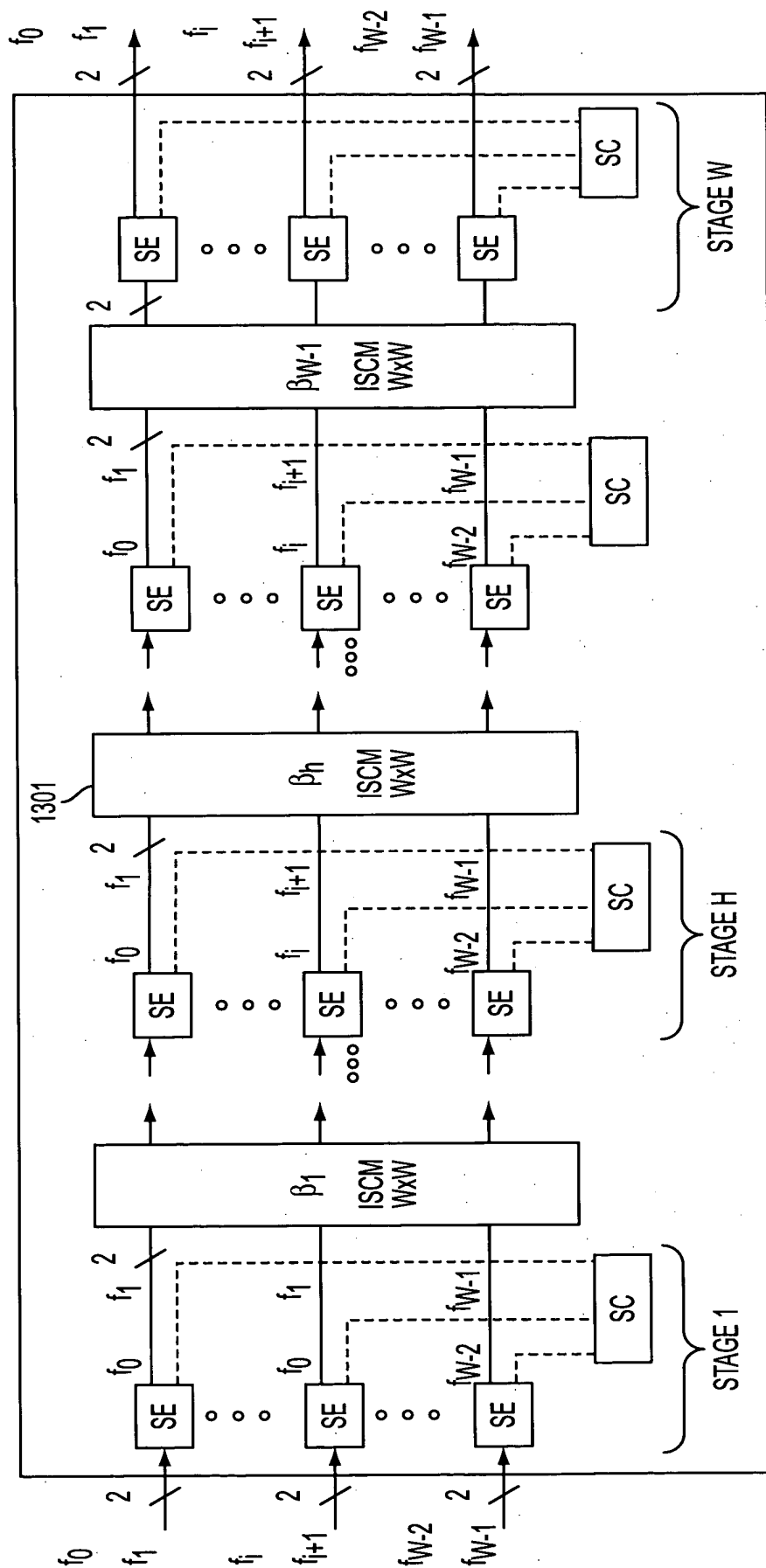
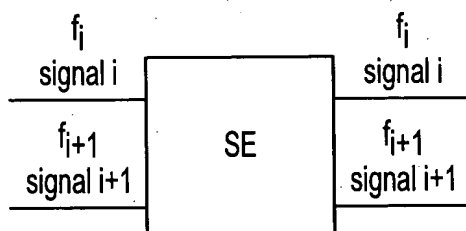
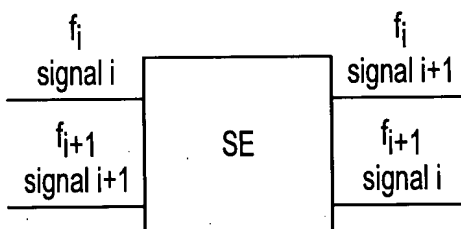


FIG. 13



BAR STATE



CROSS STATE

FIG. 14

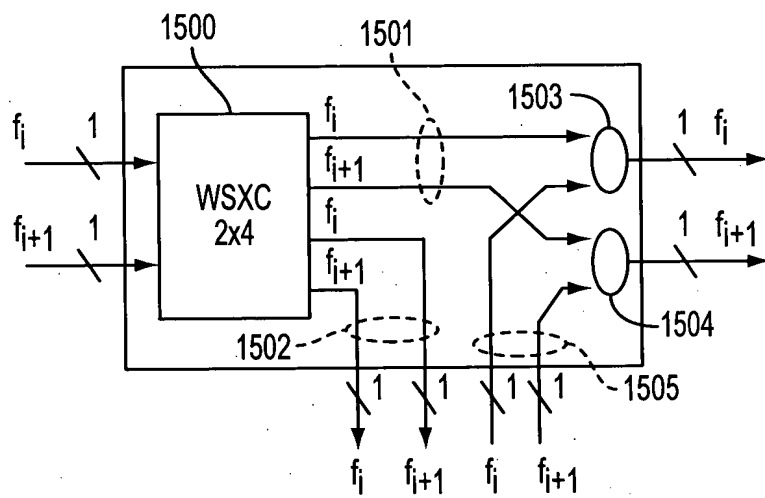


FIG. 15

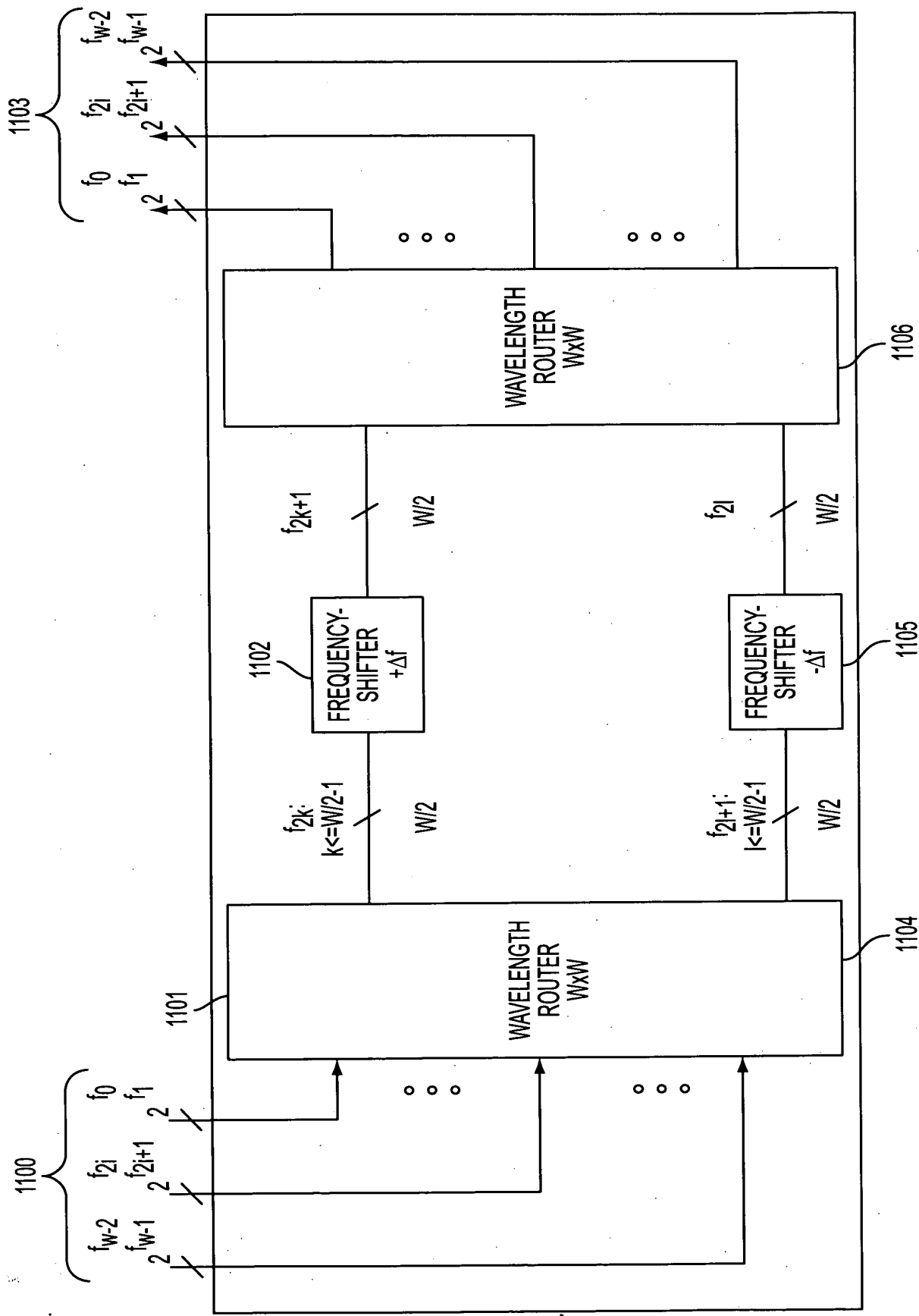


FIG. 16

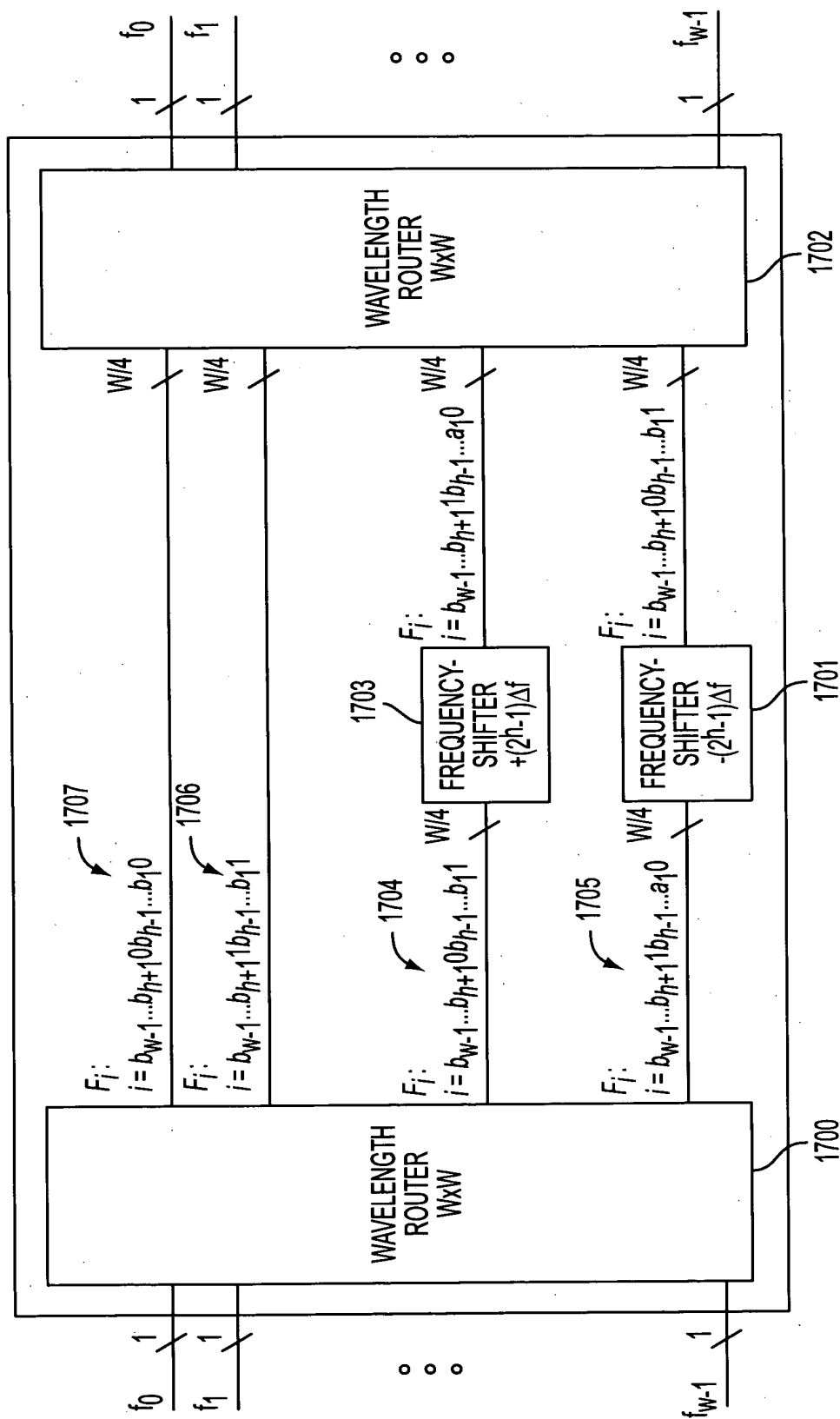


FIG. 17

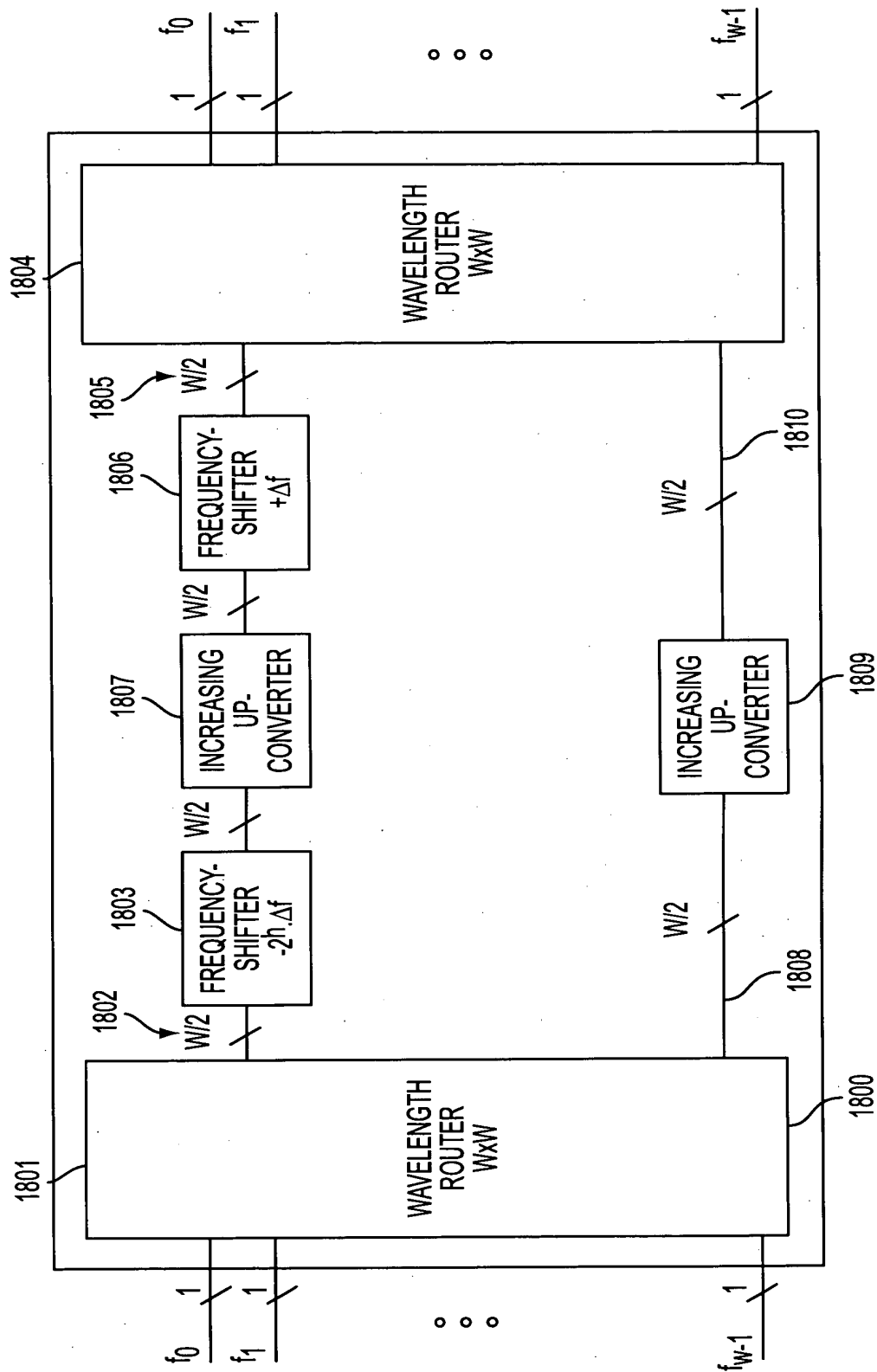


FIG. 18

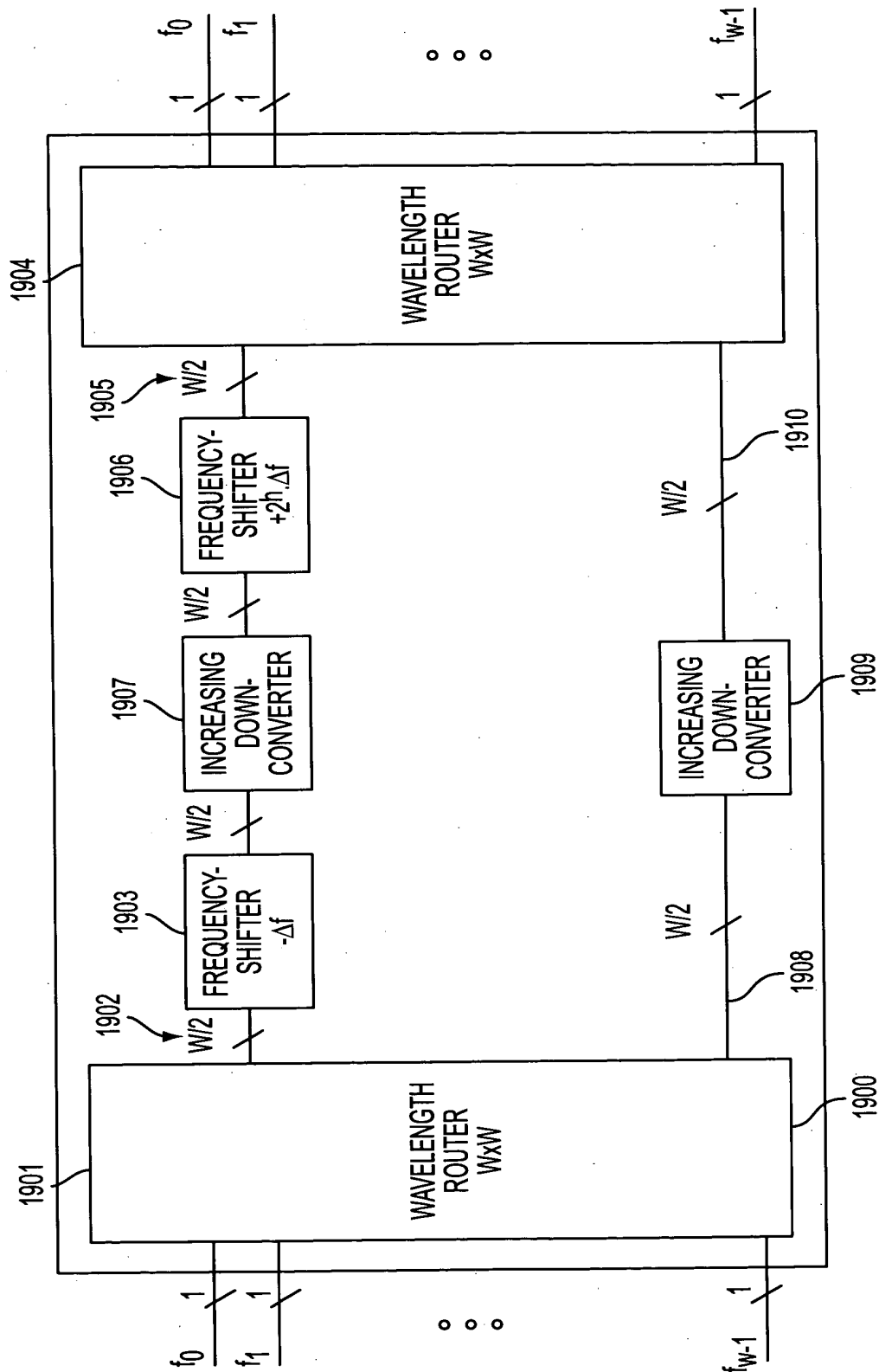


FIG. 19

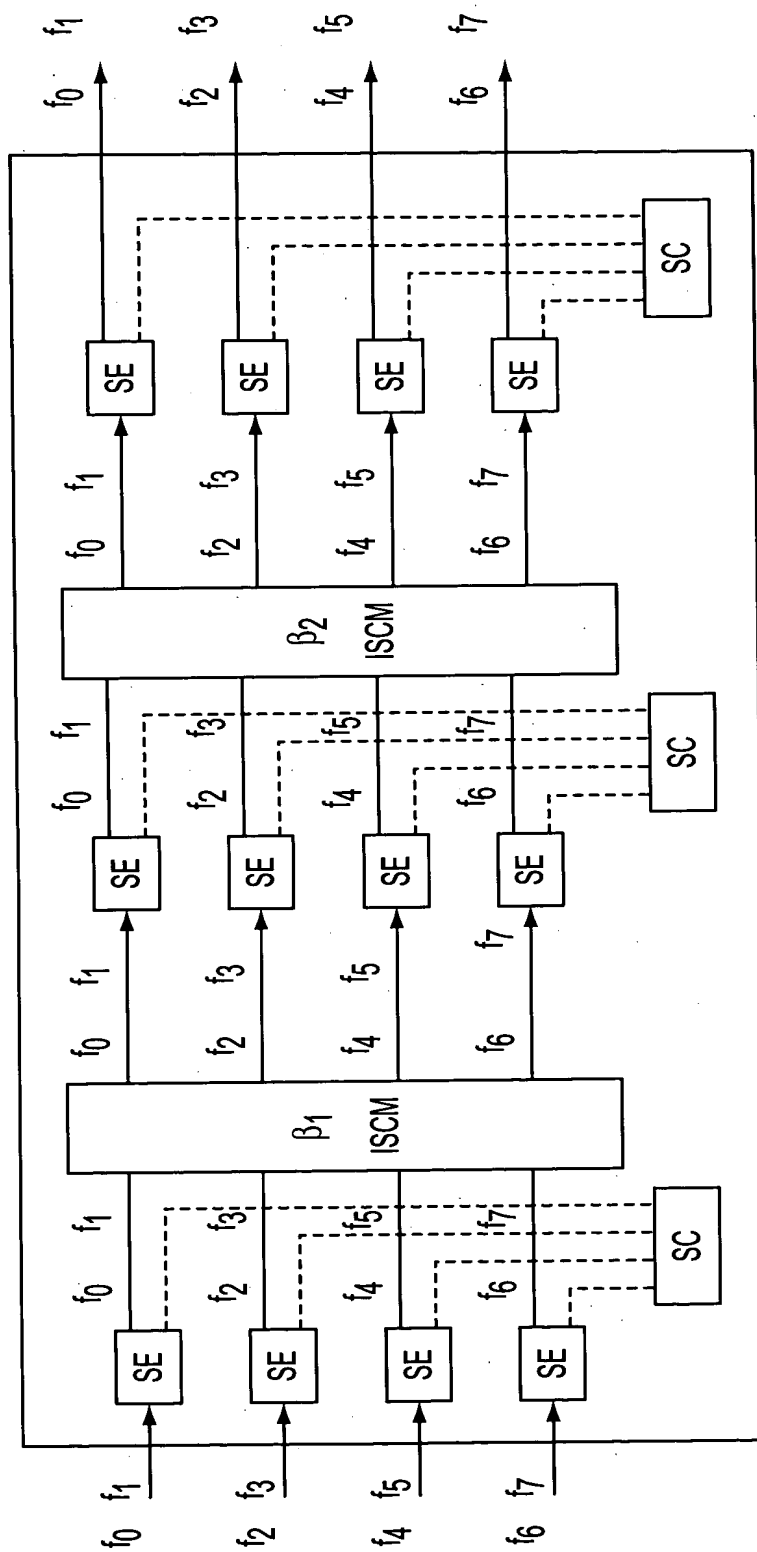


FIG. 20

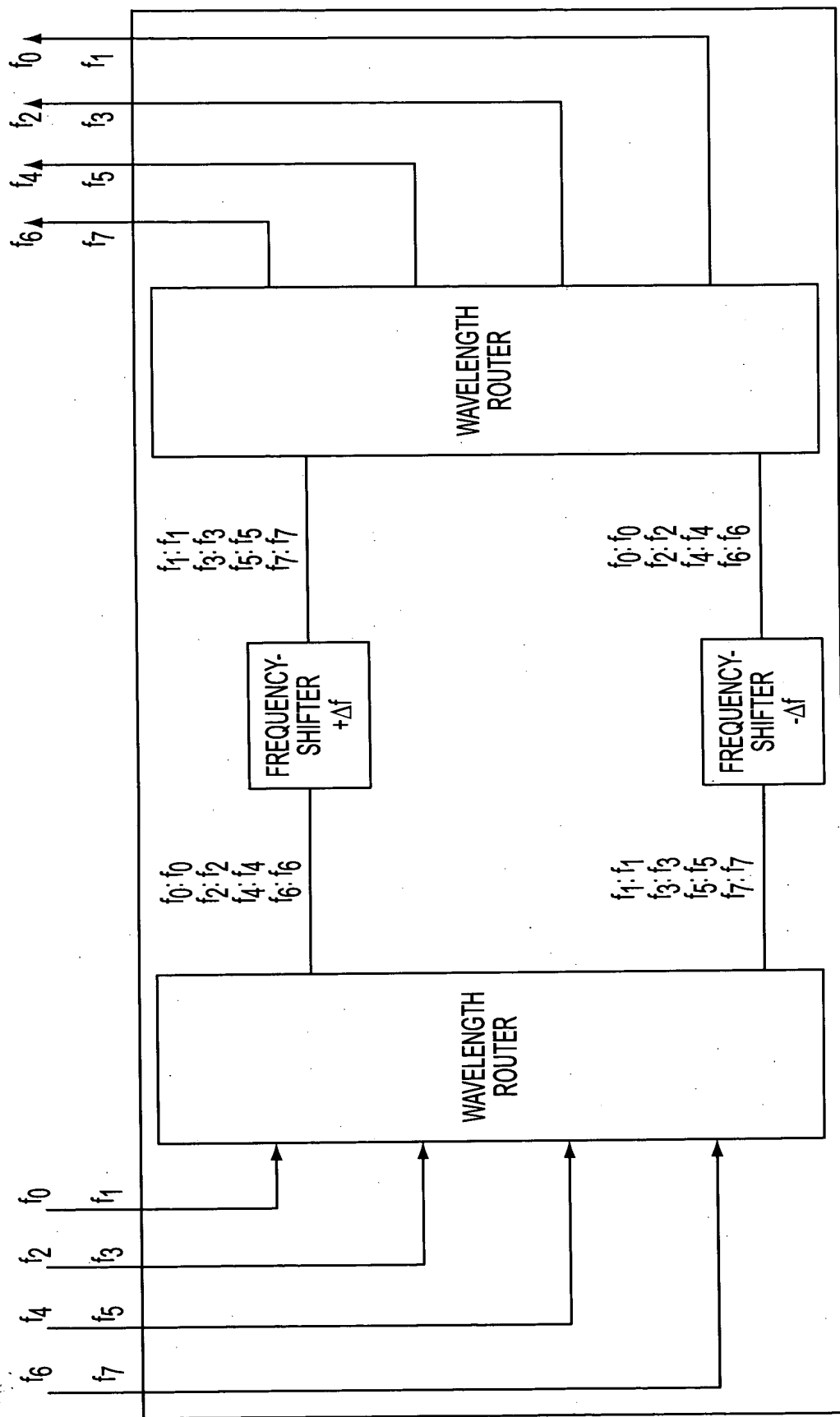


FIG. 21

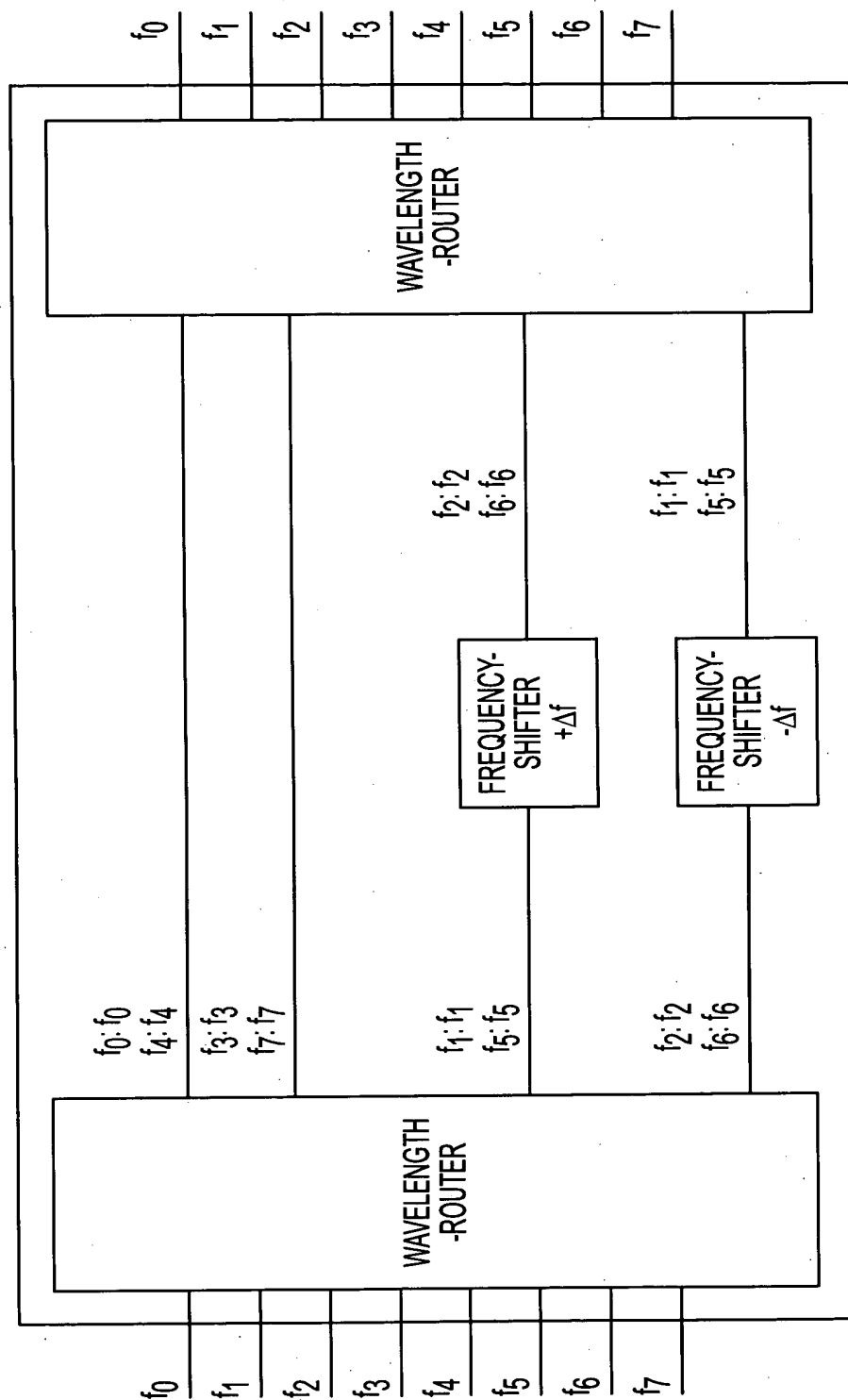


FIG. 22

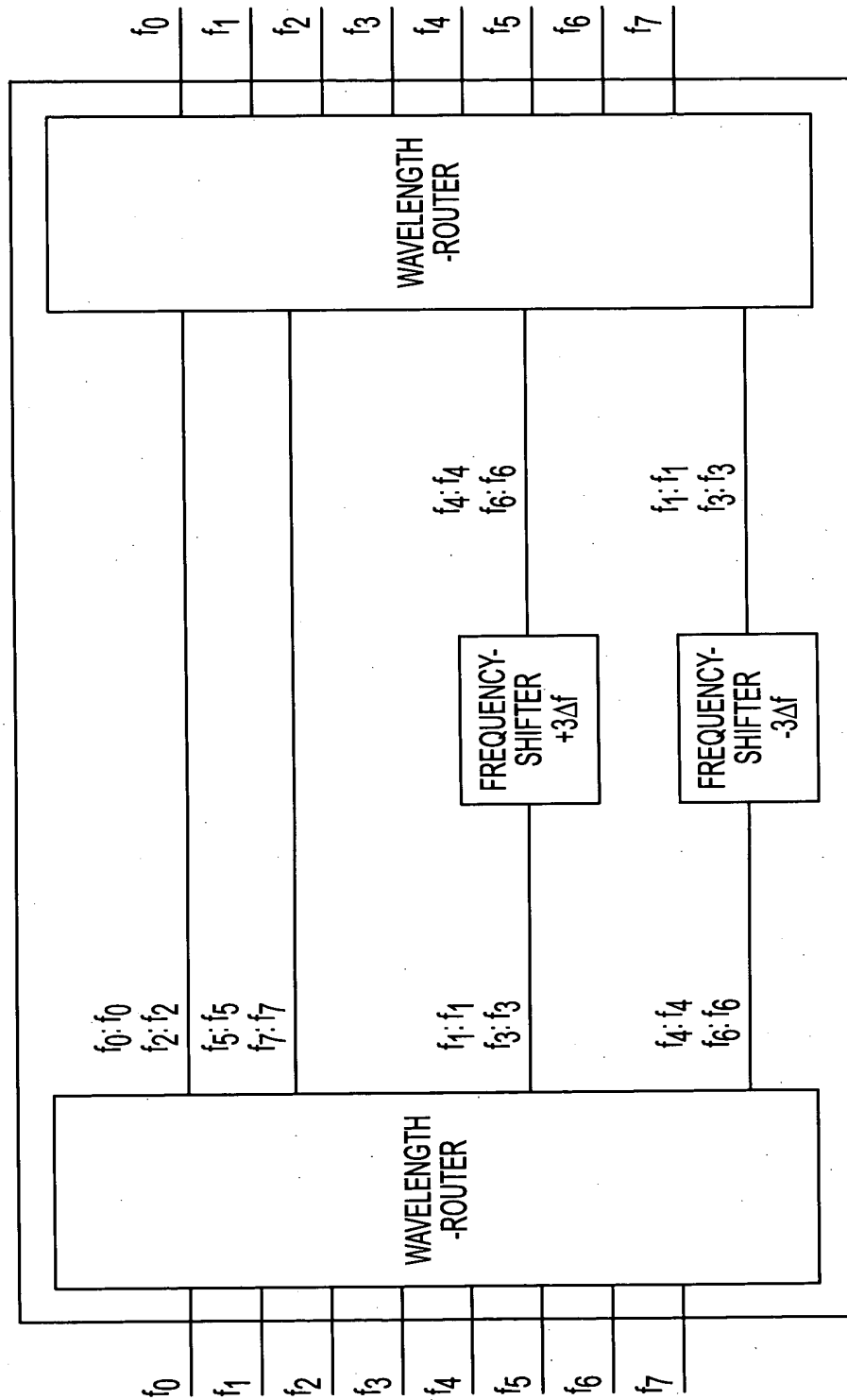


FIG. 23

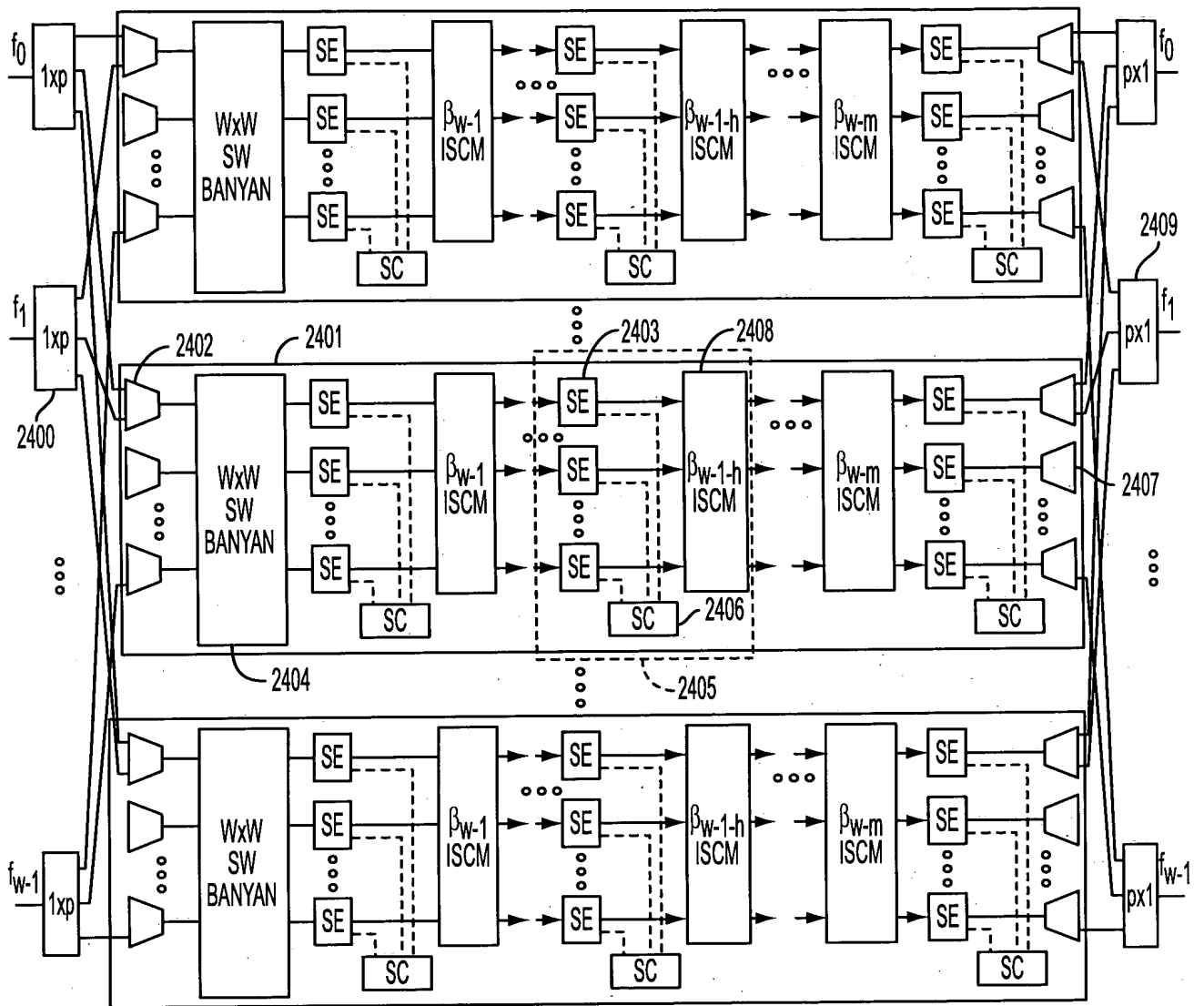


FIG. 24

	$P(0)$	$P(h)$ $0 < h < n$	$P(n)$
OMEGA	σ_{n-1}	σ_{n-1}	J
OMEGA ⁻¹	J	σ_{n-1}^{-1}	σ_{n-1}^{-1}
SW-BANYAN	J	β_h	J
SW-BANYAN ⁻¹	J	β_{n-h}	J
N-CUBE	σ_{n-1}	β_{n-h}	J
N-CUBE ⁻¹	J	β_h	σ_{n-1}^{-1}
BASELINE	J	σ_{n-h}^{-1}	J
BASELINE ⁻¹	J	σ_h	J

FIG. 25

COMPONENT	NUMBER	FREQUENCY-SHIFTERS
STATE CHANGER	$\log_2(W)$	2
BUTTERFLY ISCM	$\log_2(W) - 1$	2

FIG. 26

SELF-ROUTING NETWORK	NUMBER OF FREQUENCY-SHIFTERS
SW-BANYAN	$O(\log_2 W)$
BASELINE	$O((\log_2 W)^2)$
N-CUBE	$O(\log_2 W)$
OMEGA	$O((\log_2 W)^2)$

FIG. 27

NETWORKS	NEAR-OPTIMAL PARAMETER CHOICE	WAVELENGTH- INTERCHANGER FREQUENCY- SHIFTER COMPLEXITY	OVERALL SEPARABLE CROSS-CONNECT FREQUENCY- SHIFTER COMPLEXITY
NEAR-OPTIMAL REARRANGEABLY NONBLOCKING	$m = w-1$ $p = 1$	$4w-4$	$4.F.(w-1)$
NEAR-OPTIMAL STRICTLY- NONBLOCKING	$m = w-1$ $p = w$	$4.w^2-4.w$	$4.F.w.(w-1)$

FIG. 28